Baumann™ 51000 Series Low Flow Control Valve Instructions

CONTENTS

INTRODUCTION

The Baumann 51000 series control valve is optimally designed for demanding low flow control and is a perfect fit where space is at a premium. This compact package provides the connection integrity of flanged body globe valves while being significantly lighter and easier to install.

SCOPE OF MANUAL

This instruction manual includes installation, maintenance, and parts information for the 51000 series control valve and type 16 actuator.

No person may install operate or maintain a 51000 series control valve without first being fully trained and qualified in valve, actuator and accessory installation, operation and maintenance, and carefully reading and understanding the contents of this manual. If you have any questions about these instructions contact your Fisher® sales office before proceeding.

NOTE

Neither Emerson®, Emerson Process Management, Fisher®, nor any of their affiliated entities assumes responsibility for the selection, use and maintenance of any product. Responsibility for the selection, use and maintenance of any product remains with the purchaser and end-user.

WARNING

Always wear protective gloves, clothing, and eye wear when performing any installation operations to avoid personal injury.

Personal injury or property damage caused by sudden release of pressure or bursting of pressure retaining parts may result if service conditions exceed those for which the product was intended. To avoid injury or damage, provide relief valve for over pressure protection as required by government or accepted industry codes and good engineering practices.

Check with your process or safety engineer for any additional measures that must be taken to protect against process media.

If installing into an existing application, also refer to the WARNING at the beginning of the Maintenance section in this instruction manual.

WARNING

This valve is intended for a specific range of pressures, temperatures and other application specifications. Applying different pressures and temperatures to the valve could result in parts damage, malfunction of the control valve or loss of control of the process. *Do not expose this product to service conditions or variables other than those for which the product was intended.* If you are not sure what these conditions are you should contact your Fisher sales office for more complete specifications. Provide the product serial numbers (shown on the nameplate) and all other pertinent information.

FISHER

EMERSON
Process Management

WARNING

If you move or work on an actuator installed on a valve with loading pressure applied, keep your hands and tools away from the stem travel path to avoid personal injury. Be especially careful when removing the stem connector to release all loading on the actuator stem whether it be from air pressure on the diaphragm or compression in the actuator springs.

Likewise take similar care when adjusting or removing any optional travel stop. Refer to the relevant actuator Maintenance Instructions.

If hoisting the valve, take precautions to prevent personal injury or property damage that could result if the rigging slips. Be sure to use adequate sized hoists and chains or slings to handle the valve.

WARNING

Personal injury could result from packing leakage. Valve packing is tightened before shipment; however, the packing might require some readjustment to meet specific service conditions.

MAINTENANCE

WARNING

Avoid personal injury or property damage from sudden release of process pressure or bursting of parts. Before performing any maintenance operations:

- **Always wear protective gloves, clothing, and eye wear when performing any maintenance operations to avoid injury.**
- **Disconnect any operating lines providing air pressure, electric power or a control signal to the actuator. Take precautions to prevent actuator from suddenly opening or closing the valve.**
- **Use bypass valves or completely shut off the process to isolate the valve from the process pressure. Relieve the process pressure from both sides of the valve.**
- **Depending on the actuator construction, it will be necessary to manage the pneumatic actuator spring pre-compression. It is essential to refer to the relevant actuator instructions in this manual to perform safe removal of the actuator from the valve.**
- **Use lock-out procedures to be sure that the above measures stay in effect while you work on the equipment.**
- **The valve packing box may contain process fluids that are pressurized, *even when the valve has been removed from the pipeline.* Process fluids may spray out under pressure when removing the packing hardware or packing rings, or when loosening the packing box pipe plug.**
- **Whenever a gasket seal is disturbed by removing or shifting gasketed parts, install a new gasket during reassembly. This provides a good gasket seal because the used gasket may not seal properly.**

WARNING

Avoid personal injury or property damage by thoroughly cleaning the line of all dirt, welding chips, scale, oil or grease, and other foreign material. Failure to do so could result in damage to the seating and sealing surfaces of the valve and result in damage to the valve and release of process materials.

INSTALLATION

1. Before installing the valve in the pipeline, thoroughly clean the line of all dirt, welding chips, scale, oil or grease, and other foreign materials.
2. Install valve so the controlled fluid will flow through the valve body in the direction indicated by the arrow.
3. A three-valve bypass permits removal of the control valve from the line without shutting down the system.
4. In case of a heat-insulated installation, insulate the valve body only, not the bonnet.

ACTUATOR REMOVAL (Refer to Figures 1, 2, & 6)

1. For air to open actuators, lift actuator travel with air to lessen tension on the upper clamp nut (10).

NOTE
For Air-to-Close,
This is NOT required.

2. Gently tap upper clamp nut (10). With slight downward pressure on top of the actuator, unscrew the upper clamp nut (10) completely.
3. Type 16 actuator assembly must be unscrewed from stem adapter (26).

PLUG AND PACKING REPLACEMENT
(Refer to Figures 1 and 2)

CAUTION

When adjusting the valve stem do not grip the stem directly with pliers or a wrench. This will damage the surface of the stem, and cause damage to the packing in the valve.

1. For valves supplied with type 16 actuators, remove travel indicator disc (58). With hex jam nuts (27) still tight, loosen stem adapter (26) from stem adapter nut (31), and unthread stem adapter (26) from plug stem (4).
   For valves with rated Cv's less than 1.0, unscrew packing nut (11) and gently pull plug (4) out through top of bonnet (6).
   For valves with rated Cv's greater than or equal to 1.0, follow the **VALVE DISASSEMBLY** instructions to first remove the bonnet (6) before removing the plug (4).
2. Inspect or replace packing (9) and stem guide (8).
3. Inspect valve plug (4) for wear or particle accumulation.

VALVE DISASSEMBLY (Refer to Figures 1 and 2)

NOTE
Actuator must be removed from the valve body before valve body disassembly.

CAUTION

The valve packing box may contain process fluids that are pressurized, *even when the valve has been removed from the pipeline.* Process fluids may spray out under pressure when removing the packing hardware or packing rings, or when loosening the packing box pipe plug.

1. Remove bonnet hex nuts (7) and lift bonnet (6) off valve body (1), which may include packing (9) and plug assembly (4). (For alloy bodies, lift bonnet flange (34) off from bonnet (6) and then lift bonnet (6) off valve body (1).)
2. Remove bonnet gasket (5) and replace.
3. The cage subassembly (3) can be removed by unscrewing with a flat screwdriver, using the outer screw slot, and lifting out of valve body (1). The cage subassembly should be inspected and cleaned with water or an approved solvent. For valves with rated Cv's >/= 1.0, remove and inspect plug guide (33) for wear. Replace if necessary. Replacement of the entire assembly will be necessary if excessive leakage or wear has occurred in service.

NOTE
The seat cage gasket (2) must be replaced when the cage subassembly (3) has been removed. The seat cage will appear oblong, this is to prevent loosening of the soft seat.

VALVE REASSEMBLY

1. Place cage gasket (2) and cage subassembly (3) in body (1).
2. Tighten the cage (3) hand tight plus 1/8 of a turn. (For valves with rated Cv's greater than or equal to 1.0, insert plug guide (33).)
3. Seat plug (4) in body (1).
4. Place bonnet gasket (5) in body (1). Look at bonnet (6) and body (1) for correct bonnet orientation.
5. Place bonnet (6) on valve body (1) and secure with hex nuts (7). For alloy bodies, place bonnet (6) on valve body (1), then place bonnet flange (34) over

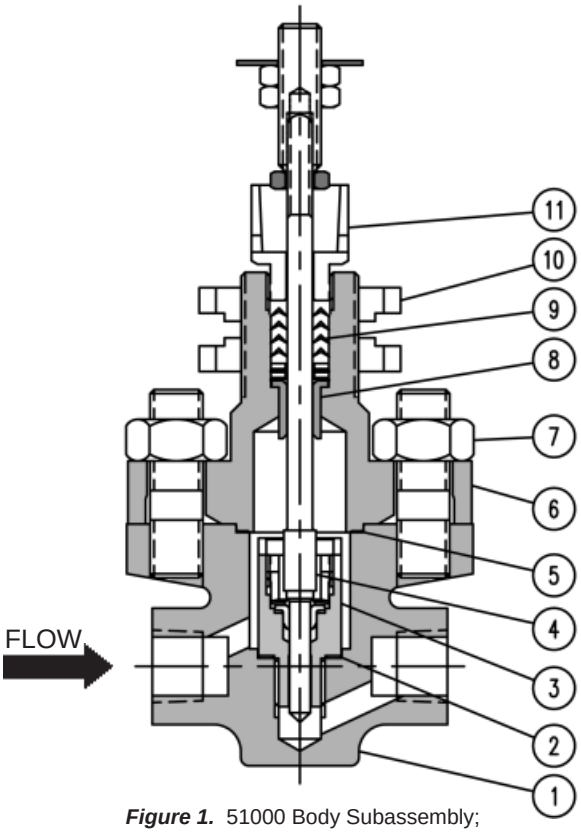


Figure 1. 51000 Body Subassembly; 0.25" Soft Seat

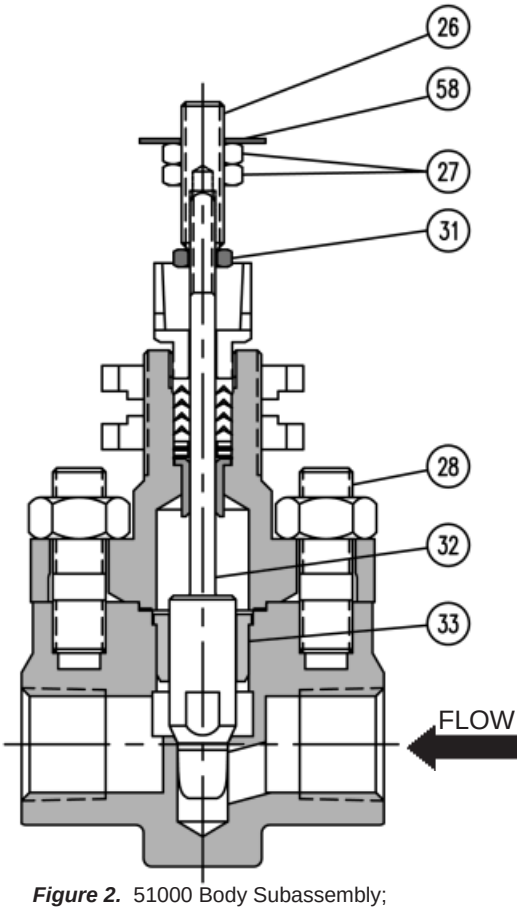


Figure 2. 51000 Body Subassembly; 0.5" Alloy Body Integral Seat

Table 1. **BODY ASSEMBLY PART NUMBERS**

KEY NO.	DESCRIPTION	QTY	PART NUMBER					
			0.25" SS	0.25" N10276 Nickel Alloy	0.5" SS Integral Seat	0.5" N10276 Nickel Alloy Integral Seat	0.5" SS Screwed Seat	0.5" N10276 Nickel Alloy Screwed Seat
1	Body	1	51102	51125	51114	51127	51112	51126
2*	Seat Cage Gasket	1	51710		N/A		51710	
3*	Soft Seat Cage Subassy	1	51201T001	51201T002	N/A		51201T001	51201T002
4*	Plug	1	See Table 2		See Table 2		See Table 2	
5*	Bonnet Gasket	1	51715		51715		51715	
6	Bonnet	1	51302	51303	51302	51303	51302	51303
7	Hex Nut	2	25705M		25705M		25705M	
8	Stem Guide	1	51601	51608	51601	51608	51601	51608
9*	V-Ring	1	N/A		N/A	51604	N/A	51604
9*	V-Ring Packing Kit	1	51607		51607	N/A	51607	N/A
10	Clamp Nut	2	51815		51815		51815	
11	Packing Follower Nut	1	51602	51602-1	51602	51602-1	51602	51602-1
28	Stud	1	51703		51703		51703	
32	Plug & Stem S/A	1	N/A		See Table 2			
33	Plug Guide	1	N/A		51206	51206-1	N/A	
34	Flange, Bonnet	1	N/A	51304	N/A	51304	N/A	51304
26	Stem Adapter		Type 16 Actuator Mounting Kit Part Number MTG51T16					
27	Hex Jam Nut							
31	Stem Adapter Jam Nut							
58	Travel Indicator Disc							
*Recommended Spare Parts								

bonnet - confirm correct orientation - then secure with hex nuts (7). **DO NOT TIGHTEN AT THIS POINT.**

6. Install stem guide (8) and packing kit (9) on the plug stem (4) in the proper order as shown in figure 3, page 6.
7. Carefully press into top of bonnet (6) making sure each part is seated properly.
8. Install packing rings over the stem one at a time. Use the packing follower nut (11) to push each packing ring in individually to avoid jamming.
9. With all required packing (9) in place, tighten the packing follower nut (11) until it becomes stiff. **DO NOT OVERTIGHTEN THE PACKING FOLLOWER (11).**
10. Now tighten hex nuts (7).

Table 2. **51000 PLUG SELECTION**

KEY NO.	VALVE SIZE	PLUG Cv	PART NUMBER ASTM A479 S21800 ANNEALED	PART NUMBER N10276 NICKEL ALLOY	MARKING CODE
4	0.5 inch ONLY	2.5	51425-411-999	51425-1-411-999	T01
		1.5	51415-411-999	51415-1-411-999	T02
		1.0	51410-411-999	51410-1-411-999	T03
	0.25 & 0.50 inch	0.45	51402-4	51402-4-1	T04
		0.2	51402-3	51402-3-1	T05
		0.1	51401-12	51402-2-1	T06
		0.06	51401-11	51041-11-1	T07
		0.03	51401-10	51401-10-1	T08
		0.015	51401-9	51401-9-1	T09
		0.008	51401-8	51401-8-1	T10
		0.004	51401-7	51401-7-1	T11
		0.002	51401-6	51401-6-1	T12
		0.001	51401-5	51401-5-1	T13
		0.0005	51401-4	51401-4-1	T14
		0.00025	51401-3	51401-3-1	T15
		0.00013	51401-2	51401-2-1	T16
Linear		0.5	51402-5	51402-5-1	T17

MATERIAL CODES: (Stamped on Plugs)
B = Nitronic 60;
C = N10276 Nickel Alloy;
A = Stainless Steel (S31600)

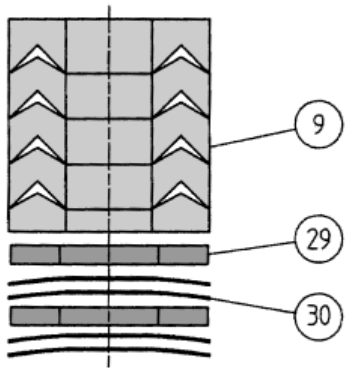


Figure 3. V-Ring Packing Kit

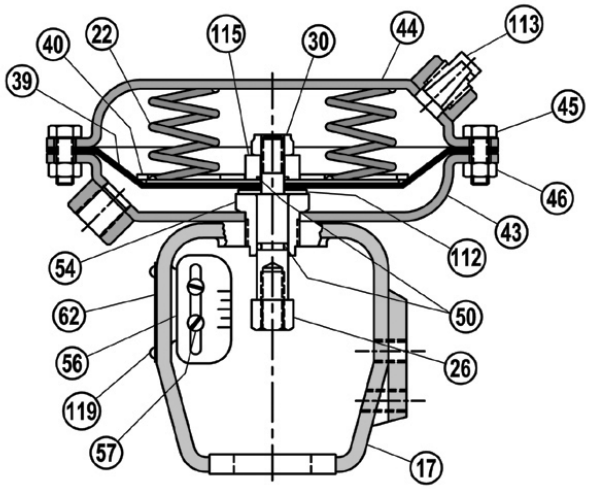


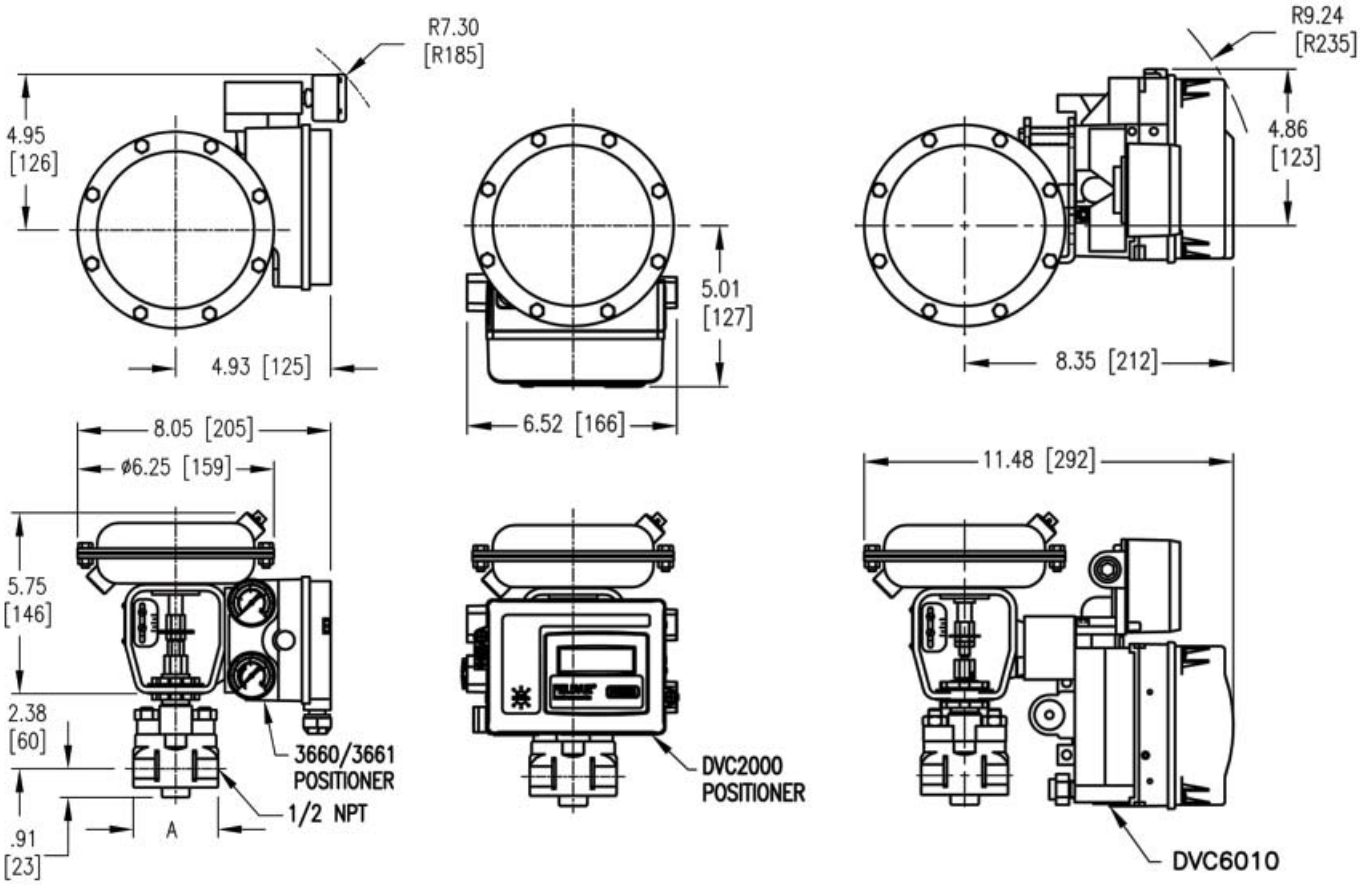
Figure 4. Type 16 Actuator

Table 3. **51000 V-RING PACKING KIT 51607**

KEY NO.	QTY	DESCRIPTION	PART NUMBER	
			316 SS Body	N10276 Nickel Alloy Body
9*	1	Packing Set	51604	
29	2	Flat Washer	51606	---
30	4	Disc Spring	51605	---
* P/N 51604 used by itself for 0.5" N10276 Nickel Alloy Packing.				

Table 4. **TYPE 16 ACTUATOR PART NUMBERS**

KEY NO.	QTY	DESCRIPTION	PART NUMBER
17	1	Yoke - Machined	81811
22	5	Spring 1/2" Stroke 4-15 psi	81860
	4	Spring 1/2' Stroke 3-15 psi	81860
26	1	Actuator Stem	81840
30	1	Hex "FLEXLOC" Nut	81844
39	1	Diaphragm	011759-001-686
40	1	Diaphragm Plate	81850-1
43	1	Lower Actuator Case	81820
44	1	Upper Actuator Case	81823
45	8	Hex Head Cap Screw	81824
46	8	Hex Nut	81825
50	2	O-Ring (FKM (Fluorocarbon))	24080
54	1	Coupling	81830
56	1	Travel Scale	983674-001-250
57	2	Pan Head Machine Screw	81812
62	1	Serial Plate	81891
112	1	Washer	25861-24
113	1	Vent Plug	24147
115	1	Collar	81870
116	1	Collar, Upper Stop (Not shown)	81842
119	2	Drive Screw	24686



Type 16 Actuator with 3660/3661Positioner

Type 16 Actuator with DVC2000 Digital Valve Controller

Type 16 Actuator with Hart® DVC6010 Digital Valve Controller with Advanced Diagnostics

Figure 5. Dimensions - inches [millimeters]

Table 5. **DIMENSIONS AND WEIGHTS, BODY SUBASSEMBLY**

VALVE SIZE		A		MATERIAL	APPROXIMATE WEIGHTS	
inch	mm	inch	mm		lbs	kg
0.25	6.35	2.20	55.9	Stainless Steel	1.4	0.64
				N10276 Nickel Alloy	2.2	1.0
0.50	12.7	2.70	68.6	Stainless Steel	1.8	0.82
				N10276 Nickel Alloy	2.6	1.18

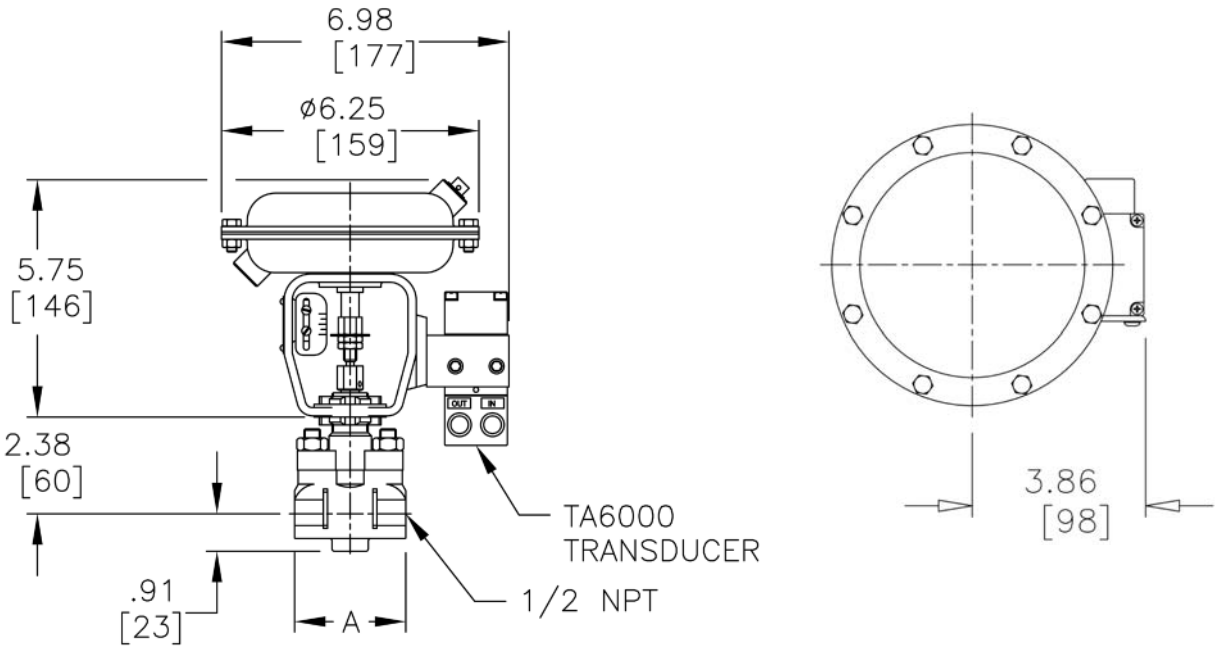


Figure 6. Dimensions - inches [millimeters] of Type 16 Actuator with TA6000 Electropneumatic Transducer (Top View on Right)

Table 6. **WEIGHTS, ACTUATOR AND INSTRUMENTS ONLY**

ACTUATOR TYPE	INSTRUMENT	APPROXIMATE WEIGHT	
		lbs	kg
16	Actuator without instrument	4.0	1.8
	Type 3660/3661 Positioner	8.0	3.6
	FIELDVUE® DVC2000	8.3	3.8
	FIELDVUE® DVC6010 (Aluminum)	12.7	5.8
	FIELDVUE® DVC6010 (St Steel)	22.0	10.0
	FIELDVUE® DVC6010f	11.0	5.0
	TA6000 Electropneumatic Transducer	5.5	2/5

Emerson Process Management

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